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FEDERAL COMMUNICATIONS COMMISSION  
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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 25 of the	)	ET Docket No. 98-206
Commission's Rules to Permit Operation	)	RM-9147
of NGSO FSS Systems Co-Frequency with	)	RM-9245
GSO and Terrestrial Systems in the Ku-	)	
Band Frequency Range	)	
	)	
Amendment of the Commission's Rules	)	
to Authorize Subsidiary Terrestrial Use	)	
of the 12.2-12.7 GHz Band by Direct	)	
Broadcast Satellite Licensees and Their	)	
Affiliates	)	

COMMENTS OF GE AMERICAN COMMUNICATIONS, INC.

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## EXECUTIVE SUMMARY

In this proceeding the Commission proposes to permit the use of the Ku-band by NGSO FSS systems. GE Americom does not object in principle to the entry of such systems into the band. However, the Commission must ensure that NGSO operations do not cause harmful interference to, or operational constraints on GSO FSS satellite systems. Over the past 25 years, GE Americom, other FSS satellite operators, and our customers have invested billions of dollars in telecommunications infrastructure. We and our customers have built businesses that rely upon the present and future availability of reliable and efficient Ku-band communications links.

The Commission's responsibility here is to ensure that any NGSO FSS use of the Ku-Band does not jeopardize these GSO operations, at least with respect to service in this country. From our perspective, the most important element of this rulemaking is the establishment of adequate limits on the operations of NGSO FSS systems in the aggregate. We must be assured that, no matter how many NGSO FSS systems are authorized, and no matter what their design or operational parameters, those systems collectively do not interfere with the services we provide to customers now or in the future.

The provisional limits adopted by the ITU at WRC-97 are of only limited relevance here. As described more fully in our comments, those limits were

based on incomplete studies, and have already been shown to be inadequate in international planning sessions looking toward WRC-2000.

The concept of aggregate pfd limits was adopted at the most recent meeting of JTG 4-9-11, and the United States has submitted papers containing parametric studies indicating what those aggregate pfd limits should be. Without aggregate pfd limits, the Commission will not be able to prevent NGSO FSS signals from causing disruptive interference to GSOs such as GE Americom. Aggregate pfd limits must therefore be put in place irrespective of the number of NGSO FSS providers that are ultimately permitted to operate in the Ku-band.

To ensure that NGSO FSS providers stay within the prescribed aggregate limits, the Commission should also use them to form the basis for single entry pfd limits. Such limits are necessary to accommodate multiple NGSO systems while preserving and enforcing compliance with the NGSO aggregate cap.

Based on the information available to GSO FSS providers thus far, GE Americom supports adoption of the pfd limits proposed by the United States at the most recent meeting of JTG 4-9-11. While this proposal is still under evaluation and may require further adjustment, it provides the best available foundation for rulemaking at this time. We note that while other limits were proposed at the JTG 4-9-11 meeting, none (except those of the French) found the WRC-97 provisional limits acceptable.

GE Americom's comments also respond to various technical and service issues relating to NGSO operations in the Ku-band upon which the *NPRM* requests comments. These rules similarly should support the goal of preventing NGSO interference into GSO satellites, and ensure NGSO compliance with rules generally applicable to satellite systems in this country.

GE Americom is committed to continuing work to evaluate and refine NGSO limits. We are confident that the Commission will do its part to prevent degradation of GSO service in this country through the rules adopted here.

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COMMENTS OF GE AMERICAN COMMUNICATIONS, INC.

GE American Communications, Inc. ("GE Americom"), by its attorneys, hereby responds to the Commission's *Notice of Proposed Rulemaking* in the above-referenced proceeding. 1/ GE Americom is primarily concerned with those aspects of the *NPRM* that respond to the petition of SkyBridge L.L.C. ("SkyBridge") for new rules to permit operation of non-geostationary satellite orbit ("NGSO") fixed-satellite service ("FSS") systems. 2/ GE Americom has previously filed comments

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1/ *In the Matter of Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range, et al.*, ET Docket No. 98-206, *Notice of Proposed Rulemaking*, FCC 98-310 (rel. Nov. 24, 1998) ("*NPRM*").

2/ The instant proceeding also was initiated in response to a separate Petition for Rulemaking filed by Northpoint Technology ("Northpoint"). *Id.* at ¶ 1.

regarding SkyBridge's separate application for a license to operate such a system, and we ask that those comments be incorporated here by reference. 3/

As explained in further detail below, the Commission must ensure that NGSO systems entering the Ku-band do not interfere with current and future geostationary satellite orbit ("GSO") FSS operations in the United States. In particular, the Commission must establish reasonable and enforceable aggregate limits on collective NGSO operations so that, no matter how many NGSO systems are launched in the future, they do not cause harmful interference to GSO service to the public. In these comments, GE Americom sets forth appropriate criteria for spectrum sharing between GSO and NGSO providers.

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Northpoint proposes to use Ku-band spectrum to provide terrestrial retransmission of local television signals and one-way data services to Direct Broadcast Satellite ("DBS") receivers. *See id.* at ¶¶ 3, 8. Northpoint is seeking authority to enter the 12.2-12.7 GHz portion of the Ku-band, which is currently allocated to the GSO Broadcast Satellite Service ("BSS") in Region 2 and in the U.S., and is used by DBS service providers. As a result, Northpoint's proposed use of the Ku-band will not likely interfere with incumbent GSO FSS operations and need only be coordinated with U.S. BSS systems, including DBS service providers.

That said, GE Americom will not address the Northpoint petition here. However, we are sympathetic to the interference problems with the Northpoint service that have been identified by DBS operators. We would be adversely affected if Northpoint were to propose operation in spectrum now used for GSO FSS, and would strongly oppose any such operation.

3/ See *In the Matter of Application by SkyBridge L.L.C for Authority to Launch and Operate a Global Network of Low Earth Orbit Satellites in the Fixed Satellite Services*, File Nos. 48-SAT-P/LA-97 & 89-SAT-AMEND-97, *Petition to Defer of GE American Communications, Inc.* (filed Dec. 15, 1997) and *Reply of GE American Communications, Inc.* (filed Mar. 20, 1998).



## INTRODUCTION

### A. Applicable Spectrum Management Principles.

#### 1. *The Commission Must Recognize the Magnitude and Importance of GSO Investment in Ku-Band Technology.*

This proceeding is a crucial one for GE Americom and its customers.

GE Americom was one of the pioneers of the commercial satellite industry. We launched our first spacecraft in 1976, and since that time have established a central position in the nation's telecommunications infrastructure through our fleet of 13 satellites, including nine with Ku-band capacity. <sup>4/</sup> Just four months ago, we launched GE-5, a new Ku-band spacecraft located at 79° W.L. We are constructing other new satellites using Ku-band spectrum to replace older spacecraft and to expand our fleet.

GE Americom's Ku-band operations represent billions of dollars in space and earth station investment on our part alone. Our customers have similarly invested billions of additional dollars in telecommunications activity that relies on uninterrupted transmissions with Ku-band satellites. GSO Ku-band satellites are proven, efficient, long-lived, and highly-reliable vehicles for many key telecommunications applications. Today, our satellites are used for the delivery of advanced data and Internet services, voice, and video services. Applications include VSAT networks, direct-to-home video, cable and broadcast program distribution,

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<sup>4/</sup> GE Americom also has authorizations to construct Ka-band satellites, and has applications pending for additional satellite authorization in other bands.

and high-speed data transmission. We fully expect GSO services in this band to evolve to meet new telecommunications requirements of customers in the future.

**2. *NGSO Systems Must Not Degrade or Constrain GSO Operations.***

We recognize that the Commission hopes to accommodate new NGSO systems in the Ku-band to the extent that sharing is technically feasible. We do not oppose non-interfering NGSO operations. But NGSO systems simply must not be allowed to degrade the quality of GSO operations.

This principle is entirely reasonable, and one that we originally understood was shared fully by SkyBridge. When we met with SkyBridge representatives at their request in 1997, SkyBridge advised us that its use of Ku-band GSO spectrum would be subject to two conditions -- conditions that also appeared in SkyBridge's subsequent petition for rulemaking and that were recited by the Commission at the start of the *NPRM*:

SkyBridge states that NGSO FSS systems should be permitted to operate in these bands according to the following conditions: (1) NGSO FSS systems operating in these bands would cause no noticeable degradation to the quality of service or availability of GSO satellite operations and terrestrial links, and (2) NGSO FSS systems operating in these bands would impose no operational constraints on GSO satellite and terrestrial operators. 5/

GE Americom agrees strongly with other GSO FSS and BSS operators and users that this SkyBridge commitment should form the cornerstone of any

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5/ *NPRM* at ¶ 2, *citing* SkyBridge Petition, RM-9147 (filed July 3, 1997) at 2 (emphasis added).

Commission decision to permit NGSO operations in the United States. We join in the comments filed today by a coalition representing a cross-section of the satellite industry who share this common bedrock position. <sup>6/</sup> Put simply, NGSO systems must operate in the United States without causing interference to the existing and planned requirements of GSO operators who already occupy heavily the Ku-band in this country, and have invested billions over the past 25 years in reliance on its unimpeded availability.

**3. *Commission Action Here Must Reflect the Pre-existing Use of the Ku-Band in the United States, and Not Simply Track the Eventual ITU Rules.***

The *NPRM* recognizes that use of the Ku-band by NGSO systems is the subject of provisional International Telecommunications Union ("ITU") rules adopted at the World Radiocommunication Conference in 1997 ("WRC-97"). The *NPRM* therefore begins with the issue of the appropriateness of those rules for domestic Ku-band activity. The WRC-97 provisional limits were based on incomplete studies, and were expressly made a placeholder pending further analysis. This further analysis is expected to be concluded at the next World Radiocommunication Conference in 2000 ("WRC-2000"). GE Americom is participating actively in pre-WRC-2000 technical process, which has already

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<sup>6/</sup> See *Comments of the Satellite Coalition*, ET Docket No. 98-206 (filed Mar. 2, 1999).

established that the provisional limits are too low to protect important GSO FSS links, and that they do not adequately account for multiple entry.

GE Americom is hopeful that final rules that permit NGSO systems to operate in the Ku-band without interference to GSO services will be established at WRC-2000. The ITU rules will directly impact GE Americom's Ku-band operations in other parts of the world. 7/

However, ITU rules are not the issue here. The Commission must ensure that, whatever NGSO operations are allowed in other countries, such systems are not allowed to cause harmful interference to GSO operators and customers in the United States. As the *NPRM* recognizes, the Commission has every right to adopt rules that are more restrictive than those of the ITU if it finds that the ITU's rules are not sufficient for domestic purposes given the heavy use that the United States already makes of the Ku-band. 8/

In that regard, two important developments have occurred since release of the *NPRM*. First, new technical analysis on NGSO/GSO sharing issues has been developed in connection with the recent Joint Task Group ("JTG") 4-9-11 meetings in Long Beach. At those meetings, the United States challenged the

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7/ GE Americom currently operates a satellite in Europe called GE-1E (also known as Sirius 2), and will be launching a satellite called GE-1A later this year to serve the market in Asia.

8/ *NPRM* at ¶ 11.

adequacy of the provisional WRC-97 limits, 9/ as did several other parties including Canada, Russia and Intelsat. While more work is in progress, it is clear that the provisional limits are insufficient, and any FCC rules in this area must acknowledge that fact.

Second, since release of the *NPRM*, the Commission has received applications for at least six additional NGSO FSS systems. These applications demonstrate that if the Commission decides to allow NGSO Ku-Band operations domestically, it also will have to decide how to allocate that spectrum among multiple systems besides SkyBridge -- and critically, how to prevent those systems in the aggregate from exceeding authorized interference into GSO operations.

Nothing in the World Trade Organization ("WTO") Basic Agreement on Telecommunications conflicts with this principle. The United States has agreed to adopt uniform rules for all NGSO and GSO systems operating in this country, and to apply those rules to foreign and domestic-owned systems on a non-discriminatory basis. But the Commission is in no way required to allocate spectrum for any particular purpose, let alone do so in ways that conflict with preexisting allocation decisions and the uses being made under those allocations. 10/ It may be that other countries decide they can accommodate service from NGSO systems that satisfy the

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9/ See United States of America, *Proposed Revision to Resolution 130 Provisional EPFD and APFD Limits in the Resolution 130 Ku-Bands*, Delayed Contribution, Document 9-9-11/US62R2 (Dec. 10, 1998).

10/ See Fourth Protocol to the General Agreement on Trade in Services (Apr. 30, 1996); *NPRM* at ¶ 12.

final WRC-2000 rules, even if those rules do not adequately protect GSO operations in those countries. But the United States must make independent decisions based on its own preexisting use, and expected future use, of the Ku-band by GSO FSS systems.

**B. The Importance of Adequate and Enforceable  
Aggregate Limits on NGSO System Interference.**

The Commission's *NPRM* recognizes that GE Americom and other GSO FSS providers in the Ku-band can be harmed by interference generated by NGSO systems such as SkyBridge. *See NPRM* at ¶ 9. The *NPRM* therefore proposes and requests comment on, among other things, pfd, equivalent power flux-density ("epfd") and aggregate power flux-density ("apfd") limits (collectively, "pfd limits") for NGSO FSS operations in the Ku-band. 11/

Technical analysis of NGSO/GSO sharing will continue over the next several months. In a sense, then, this rulemaking is premature. GE Americom sets forth its comments below based on the technical record as it exists today, and with a commitment to continue to work towards NGSO operating rules that permit that

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11/ See, e.g., *NPRM* at ¶ 26. Pfd is a measure of the amount of energy emitted by a transmitter that is present over a unit area at the Earth's surface or at the satellite, and it is a critical factor in determining whether satellite systems can successfully share spectrum with other services or satellite systems. *Id.* at ¶ 5. Epfd is the sum of the power levels of all possible interfering transmissions from all satellites in a particular NGSO constellation into a particular GSO earth station receiver. *Id.* Apfd is the sum of the power levels at a location on the GSO arc created by all visible earth station transmitters in the NGSO system. *Id.*

service to go forward without harm to the enormous investment already made in Ku-band GSO telecommunications.

That said, we emphasize that regardless of which pfd limits are selected for individual satellites, earth stations, and NGSO FSS systems, it is imperative that aggregate pfd limits be established to limit the total amount of interference caused to U.S. GSO FSS and BSS systems. These aggregate limits must be enforced irrespective of the number of NGSO FSS providers that are ultimately permitted to operate in the Ku-band. This concept has already been recognized by JTG 4-9-11 and was adopted at its most recent meeting. 12/ Without aggregate limits, the Commission will not be able to prevent NGSO FSS signals from causing disruptive interference to carriers such as GE Americom.

To ensure that NGSO FSS providers stay within the prescribed aggregate pfd levels, the Commission should also use the aggregate limits as a basis for developing single entry pfd limits, and not permit any NGSO FSS provider to exceed its assigned limit. This is particularly important because, in the absence of (aggregate-based) single entry pfd limits, the Commission may have a difficult time correcting situations where NGSO FSS providers as a group begin to exceed the aggregate cap. In order for the Commission's aggregate pfd limits to hold up over

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12/ *Derivation of Number of NGSO FSS Networks to be Considered in Sharing Studies*, Document 4-9-11/TEMP/77E, International Telecommunications Union, Radiocommunication Study Groups, Joint Task Group 4-9-11, Sub-Group 8 (Jan. 28, 1999) ("*Document Temp 77*").

time and remain effective, spectrum sharing between NGSO FSS systems will require that single entry pfd limits be well-defined, strictly enforced, and capable of being revised if the aggregate cap will be exceeded by the entry of additional NGSO FSS systems. Otherwise, confusion concerning the spectrum rights of incumbents and individual NGSO FSS operators may ensue, introducing unnecessary litigation and uncertainty into the Commission's management of the Ku-band.

GE Americom also believes that the Commission's proposed pfd limits, as well as the WRC-97 pfd limits on which they are based, must be tightened to adequately protect GSO FSS and BSS interests. Based on the information available to GSO FSS providers thus far, the best way to do this would be to adopt the aggregate pfd limits proposed by the United States at the most recent JTG 4-9-11 meeting. At that meeting, the United States presented a paper, approved at National Committee, containing parametric studies identifying the aggregate pfd levels that would adequately protect U.S. GSO FSS and BSS systems, yet allow sufficient latitude for NGSO FSS operations. <sup>13/</sup> These proposed limits are still under evaluation and may require further adjustment. GE Americom and others are currently examining this possibility. Meanwhile, however, they provide the best available foundation for rulemaking here.

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<sup>13/</sup> See *Proposed Revision to Resolution 130 Provisional EPFD and APFD Limits in the Resolution 130 14/11 GHz Bands*, Document 4-9-11/342, International Telecommunications Union, Radiocommunication Study Groups, Joint Task Group 4-9-11 (Jan. 13, 1999) (including *Addendum 1, Corrigendum 2, and Addendum 2*) ("*Document 342*").



It is notable that recent applicants for Ku-band NGSO FSS operations have developed imaginative sharing and mitigation schemes which better shield GSO FSS and BSS operations from harmful interference. These mitigation techniques indicate that the adoption of reasonable aggregate and single entry pfd sharing limits should not be a barrier to effective U.S. NGSO FSS operations.

\* \* \*

GE Americom responds more specifically to the issues raised in the *NPRM* in the sections below. Section I of these comments describes more fully the need for an aggregate pfd level and explains its relation to single entry pfd limits. Section II explains why the *NPRM*'s proposed pfd limits are unacceptable, and why the limits presented by the United States in JTG 4-9-11 are a more balanced solution. Section III responds to various technical and service issues relating to NGSO operations upon which the *NPRM* requested comment.

**I. PFD LIMITS FOR NGSO FSS PROVIDERS MUST BE SUBJECT TO AN AGGREGATE CAP.**

[Responsive to ¶¶ 69-74]

At its most recent meeting, JTG 4-9-11 preliminarily decided that, under typical conditions, the Ku-band should be able to accommodate between three and five NGSO FSS systems without causing disruptive interference to GSO FSS providers. <sup>14/</sup> In theory, the exact figure within this three to five range will vary

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<sup>14/</sup> See Document Temp 77. The number of NGSO FSS systems that the Ku-band can accommodate without causing disruptive interference is commonly

depending upon, among other things, the number of satellites that comprise the NGSO FSS constellation, as well as the number and types of earth stations that are deployed to receive the signals.

As discussed above, an aggregate cap on total NGSO interference is the most crucial rule for NGSO operators and customers. Thus, irrespective of what the Commission eventually decides “N” should be in the United States, it is imperative that the Commission place a hard cap on the aggregate level of emissions produced by all Ku-band NGSO FSS providers operating in this country. To ensure that this aggregate level is not exceeded, the Commission should also set single entry limits for NGSO FSS operators based on apportioning the allowable aggregate interference level.

Although the allowable aggregate interference level can be fairly accurately determined based on existing conditions in the Ku-band, the number of NGSO FSS systems that likely can coordinate their operations is far less certain. For this reason, if it appears that the aggregate interference limit is likely to be broached using the single entry criteria, a subsequent adjustment may be necessary.

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referred to as “N.” The tentative conclusion of JTG 4-9-11 is therefore referred to as “N = 3 - 5.”

**A. Aggregate pfd Limits**

The principle of a hard cap on the aggregate level of emissions has already been accepted by JTG 4-9-11, and is expected to be further refined before being adopted at WRC-2000. Specifically, in *Document Temp 77*, JTG 4-9-11 agreed that, irrespective of how many actual NGSO systems are ultimately permitted to operate in the Ku-band, coordination procedures among NGSOs must be in place to ensure “*that the aggregate [pfd] mask into GSO networks is still met.*” <sup>15/</sup> In other words, regardless of what the ITU decides “N” should be, NGSO providers cannot be able to, collectively, cross the aggregate pfd cap.

The concept of an aggregate cap is referenced in other parts of *Document Temp 77* as well. For instance, *Document Temp 77* recognizes that the actual number of NGSO FSS systems that can operate in the Ku-band may be larger than three to five if each system does not each generate significant interference. <sup>16/</sup> The converse of this must therefore be true as well: the actual number of NGSO FSS systems that can share space in the Ku-band may be less than three to five if the systems generate more than a standard level of interference. The amount of interference produced by each NGSO FSS system can vary. <sup>17/</sup> For this reason, it was agreed that the relevant variable in determining

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<sup>15/</sup> *Id.*

<sup>16/</sup> *Id.* (“The actual number of systems “N<sub>physical</sub>” that can operate co-frequency could be larger than the equivalent number “N<sub>effective</sub>” of systems.”)

<sup>17/</sup> *Id.* (“It is likely that different non-GSO systems operating co-frequency would use heterogeneous orbital parameters, i.e., that their constellation height and

how many NGSO FSS providers can utilize the Ku-band should not be the number of actual systems, but rather the number of “equivalent systems.” <sup>18/</sup>

JTG 4-9-11 deferred to its next meeting the question of how to mathematically define “equivalent systems.” *NPRM* at ¶¶ 72-74. The overall point, however, is clear: the acceptable number of NGSO FSS systems operating in the Ku-band hinges upon the aggregate level of interference that these systems will generate. For this reason, it is imperative that the Commission place an aggregate cap on NGSO FSS operations in the Ku-band to ensure that GSO FSS providers and other users of that band are protected.

At this time, GE Americom believes that the appropriate aggregate caps are the one proposed by the United States at the most recent meeting of JTG 4-9-11. <sup>19/</sup> The Commission should recognize, however, that engineers in the GSO community are still working on this matter to ensure that the caps adequately protects GSO interests. Should the proposed aggregate caps be revised, GSO FSS providers will convey that information to the Commission. Until that time,

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inclination would not be identical and that their communication parameters would be different, such that the interference profile that they produce would not be the same.”)

<sup>18/</sup> *Document Temp 77, Annex 1* (“It was agreed for that purpose that the relevant parameter is not the actual number of non-GSO systems that can operate in a given band, but the number of equivalent systems “ $N_{\text{effective}}$ ,” each causing similar single-entry EPFD levels into GSO FSS networks.”)

<sup>19/</sup> *Document 342.*

however, the Commission should look to *Document 342* as the best currently available guideline for developing rules here.

**B. Single Entry pfd Limits**

In order for the Commission's aggregate pfd limits to hold up over time, it is imperative that the Commission's spectrum sharing rules be equitable for all systems. To ensure that this happens, the Commission should set single entry pfd limits for every NGSO FSS provider in the Ku-band.

Single entry pfd limits for NGSO FSS entrants, and ongoing validation of compliance, will ensure that no single provider produces more signal interference than allowed in order to keep all NGSO FSS providers below the aggregate pfd cap. In the absence of such limits, it will be possible -- indeed, perhaps even likely -- that NGSO FSS operators will collectively exceed the aggregate pfd limits, thereby causing harmful interference to GSO FSS operations in the Ku-band. Such collective interference will be difficult for the Commission to address, as no particular NGSO FSS system necessarily will be totally responsible for it. This may lead to regulatory uncertainty and protracted litigation that will consume the resources of NGSO FSS providers, GSO FSS providers, and the Commission.

Put another way, SkyBridge is essentially asking the Commission to establish *a priori* coordination rules that will set boundaries for current and future GSO systems. GSO operators and customers obviously have a need to avoid interference to their existing services. They also need regulatory certainty to

enable them to plan new services without protracted disputes over NGSO interference. The cost and risk of such disputes can be enough to deter investment in valuable new GSO services, and deflect part of the purpose of a hard cap on aggregate interference. Single entry epfd limits for NGSO systems are therefore fundamental to ensuring the continuity that all parties need to offer reliable services.

In *Document Temp 77*, JTG 4-9-11 recognized the integral role single entry pfd limits play in maintaining the aggregate cap. 20/ Specifically, in drafting guidelines for determining the numerical definition of “equivalent systems,” JTG 4-9-11 stated:

The implementation of interference mitigation techniques between the different non-GSO FSS systems in order to provide adequate protection to all other non-GSO systems should be considered simultaneously with those mitigation techniques required to meet the single-entry EPFD levels in order to assess the cumulative interference effect from multiple non-GSO FSS systems.

*Document Temp 77*. In other words, single entry pfd limits are inextricably intertwined with the establishment of an aggregate pfd cap. The Commission should heed the directive of JTG 4-9-11 in this area and promulgate single entry pfd limits that will be enforced vigorously.

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20/ *Document Temp 77, Annex 1* (stating that the purpose of determining how many NGSO FSS systems can share a given frequency is so that single entry pfd levels can be converted into aggregate pfd levels, or vice-versa).

Single entry pfd limits are also necessary because, in their absence, the first NGSO FSS entrants in the Ku-band will have an incentive to utilize a large portion of the spectrum devoted to NGSO FSS operations. Even if this is only done on a temporary basis, it may diminish the space available for newer NGSO FSS providers once they are prepared to enter the market, and will certainly complicate the sharing and coordination process among NGSO FSS applicants and operators. Moreover, at worst, this may also cause the earliest NGSO entrants to be reluctant -- or unable -- to scale back their use of the Ku-band to make room for subsequent entrants. GSO operators and their customers should not face the business and technical risk that "spectrum-hogging" by the first NGSO system will create, especially because it may lead to a call to reopen the aggregate cap by new NGSO systems to accommodate them. We need certainty now and indefinitely that NGSO operations in this band, if allowed, will never interfere with GSO systems.

**II. THE NGSO PFD LIMITS PROPOSED BY THE UNITED STATES AT THE JTG 4-9-11 MEETING PROVIDE THE BEST AVAILABLE FOUNDATION FOR NEW RULES AT THIS TIME.**

[Responsive to ¶¶ 17, 26, 33, 46, 50-53, 64-66]

The Commission's *NPRM* requests comment on the pfd limits that should apply to NGSO FSS operations to avoid causing interference with, among others, GSO FSS providers in the Ku-band. 21/ In doing so, the *NPRM* divides the Ku-band into subsections and proposes unique pfd limits for each type of NGSO

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21/ See, e.g., *NPRM* at ¶¶ 26, 36, 46, 54, and 58.

FSS system and earth station in those subsections. 22/ Most of the pfd limits proposed by the Commission mirror the provisional pfd limits that came out of WRC-97. As explained by the United States and others in JTG 4-9-11, however, these single entry provisional pfd limits were not developed from agreed upon aggregate interference levels. Therefore, they do not adequately protect GSO FSS providers in the Ku-band, and could cause harmful interference to GSO services if more than one NGSO FSS system operates at these provisional limit levels.

The provisional pfd limits adopted at WRC-97 were intended to be temporary, and no member of the ITU has claimed them to be optimal. The U.S. has also declared that the WRC-97 pfd limits should be “. . . subject to detailed technical study and review by ITU-R and to confirmation by the next competent radiocommunication conference. 23/ At the most recent meeting of JTG 4-9-11 earlier this year, five different sets of pfd limits for NGSO FSS operations in the Ku-band were proposed and vigorously debated. 24/ Significantly, all limits proposed except those of France were more restrictive than the provisional WRC-97 standards. Work is continuing on this subject in preparation for further international discussions in late March and April. It is unclear, however, whether the ITU will come any closer to achieving consensus on this issue at that time.

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22/ See *id.*

23/ See U.S. Declaration (No. 52) to *Final Acts WRC-1997*, World Radiocommunication Conference, Geneva, Switzerland (signed 11/21/97).

24/ The differing proposed pfd limits were presented by Canada, France, INTELSAT, Russia, and the United States.



Dozens of technical studies have been filed by numerous carriers and countries since WRC-97 indicating that the provisional pfd limits for NGSO FSS operations in the Ku-band require revision. In light of the demonstrated problems with the WRC-97 provisional pfd limits, it would be premature for the Commission to, as proposed, simply adopt them wholesale. The *NPRM*, in fact, recognized that the provisional limits will probably only be adopted at WRC-2000 “if no acceptable alternative is developed.” *See, e.g., NPRM* at ¶ 26. Since issuance of the *NPRM*, the United States itself has proposed a more acceptable alternative to the provisional pfd limits, and further work in this area is continuing. Clearly, the provisional limits are not appropriate for adoption here.

At this point, the record best supports Commission adoption of the aggregate pfd limits proposed by the United States in the JTG 4-9-11 process, both for the protection of U.S. GSO FSS and BSS systems, and for the public that depends upon the reliability of those systems. During the JTG 4-9-11 process, the United States presented a paper containing parametric studies illustrating why its proposed aggregate pfd limits are necessary.<sup>25/</sup> Although some in the international community have challenged the pfd limits that came out of those parametric studies, no party has disputed the technical principles on which the

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<sup>25/</sup> *See Document 342.* The United States also presented a separate paper addressing aggregate pfd limits in the Ka-band.

paper is based. Accordingly, it is technically sound and could be readily adopted by the Commission.

Meanwhile, as indicated above, at least five different proposals for international pfd limits will be under consideration at the next ITU meeting. Some of these proposals, including that of INTELSAT, are extremely close to the U.S. numbers and may be capable of being reconciled. More importantly, all of these proposals call for tighter pfd limits than the ones proposed in the Commission's *NPRM*.

While GE Americom is hopeful that the ITU process will work itself out and that an international consensus will be reached, it is imperative that, regardless of what happens at the ITU, the Commission adequately protect Ku-band GSO FSS and BSS services in this country. This means that, until a consensus is reached, or in its absence, the Commission must adopt the reasonable pfd limits proposed by the United States at the JTG 4-9-11 meeting this past January. Should consensus on revisions to the provisional limits not be reached at WRC-2000, the Commission should adopt the U.S.-proposed sharing limits for operations in the U.S. permanently.

### **III. OTHER ISSUES CONCERNING NGSO OPERATIONS IN THE KU-BAND.**

In addition to soliciting input on aggregate, single entry, and specific pfd limits for NGSO FSS providers entering the Ku-band, the *NPRM* seeks comment on a host of other technical and service-related issues concerning NGSO

operation in that band. GE Americom's views with respect to these issues are discussed below.

**A. Northpoint Petition.**

[Responsive to ¶¶ 90-98]

Northpoint proposes to use the 12.2-12.7 GHz band on a secondary basis to provide terrestrial retransmission of local television signals and one-way data services to DBS receivers. *NPRM* at ¶ 8. GE Americom's U.S. satellites are not directly affected by this proposal.

Our primary concern is that Northpoint not try to expand its reach and seek spectrum adjacent to the 12.2-12.7 GHz band, thereby impacting GSO FSS providers. We are aware that BSS licensees have expressed serious problems with the Northpoint Petition. As a result, we will not address it here. It is extremely important, however, that the Commission not try to resolve the dispute between Northpoint and the BSS licensees by offering Northpoint other FSS spectrum in the Ku-band. Demand for this spectrum has already reached a saturation point, and it cannot accommodate additional users.

**B. Coordination Procedures for Large Earth Station Antennas in the 10.7-11.7 GHz Band.**

[Responsive to ¶ 27]

The *NPRM* seeks comment on whether coordination procedures rather than epfd limits are necessary to protect GSO FSS networks with large earth station antennas in the 10.7-11.7 GHz band. *Id.* at ¶ 27. Generally, GE Americom

believes that the Commission's pfd limits should cover all earth stations and antennas. Large earth stations present a problem, however, because they require extremely high levels of protection. Were the Commission to include large earth stations in its pfd calculations, the resulting pfd limits would be excessive and could not reasonably be applied in all environments.

In order to keep pfd limits at a reasonable level, GE Americom believes that large earth stations that fall outside the scope of the pfd limits must instead be coordinated. More specifically, GE Americom believes that earth stations larger than fifteen meters in diameter should be subject to this coordination process.

A number of papers relating to coordination procedures for large earth station antennas are being considered in the ITU process. These papers contain information on specific coordination procedures that should be followed when the pfd limits cannot reasonably be applied. GE Americom endorses the coordination procedures recommended by these papers and believes that the Commission should adopt them.

**C. Degree of Inclination for GSO Satellites.**

[Responsive to ¶ 27]

GSO FSS providers routinely place older spacecraft in inclined orbit to extend the useful life of such satellites and provide economical service to customers. *Id.* at ¶ 27. The *NPRM*, however, suggests that GSO satellites with too large a north/south inclination can hamper NGSO system capacity. *Id.* The *NPRM* seeks

comment on whether GSO satellites should be limited to a maximum inclination under the proposed Ku-band sharing arrangements to avoid this result.

Generally, the degree of inclination ascribed to a GSO satellite will increase over time. A satellite may be inclined only marginally when first put in inclined orbit, with the extent of inclination increasing gradually to approximately five degrees over seven years. GE Americom submits that any NGSO rules should accommodate GSO inclinations of up to five degrees. This standard accommodates the interest of GSO operators and customers in extracting a reasonable lifetime from a GSO spacecraft.

**D. Protection of Telemetry, Tracking and Control Operations.**

[Responsive to ¶ 29]

To ensure that NGSO FSS operations do not disturb GSO Telemetry, Tracking and Control (“TT&C”) operations during the launch and operational phases of their spacecraft, the Commission proposes that GSO (FSS and BSS) and NGSO FSS licensees consult with each other during those phases. *Id.* at ¶ 29. GE Americom agrees that such consultation should take place, as is now the standard practice during all deployment operations.

**E. Protection During Satellite or Launch Malfunctions.**

[Responsive to ¶ 31]

On rare occasions due to a satellite or launch malfunction, a GSO or NGSO FSS provider's ability to communicate with its space station can become severely impaired. During these emergencies, it is imperative that interference from one system not hamper the ability of the other to regain control over its satellite system. The *NPRM* seeks comment on how this can be accomplished. *Id.* at ¶ 31.

Preventing interference between GSO and NGSO FSS operations in these situations is a serious and important issue. Satellite and launch malfunctions can threaten million dollar investments, as well as jeopardize the positioning and effectiveness of other systems. GE Americom agrees that in an emergency, parties should be able to exceed limits in order to recover control of spacecraft. However, NGSO operators, like GSO operators, should be required to use frequencies at the edge of the band for such purposes to minimize interference.

**F. Maintaining an "International Systems Only" Restriction for GSO FSS Operators in the 12.75-13.25 GHz Band.**

[Responsive to ¶ 33]

The *NPRM* proposes to permit NGSO FSS providers to operate in the 12.75-13.25 GHz band. However, due to the large number of incumbents and

limited space available in that band, the *NPRM* seeks to maintain an “international systems only” restriction for GSO FSS providers. *Id.* at ¶ 33.

GE Americom believes that the Commission should withdraw its “international systems only” requirement for the 12.75-13.25 GHz band in light of the fact that this band is internationally allocated for domestic use. Where possible, the Commission should strive to apportion spectrum in a manner that will be consistent with allocations throughout the world. This is an instance in which the ITU’s allocation makes sense, and the Commission should seek to replicate it.

More importantly, there is no reason why NGSO FSS operators should be permitted to use this spectrum (as well as the 10.7-11.7 GHz band, which also carries an “international systems only” restriction for GSO FSS providers) for domestic communications to the exclusion of GSOs. NGSOs entering the Ku-band will be competing vigorously with GSO FSS providers for customers. There is no reason why GSO FSS providers should be locked out of the 12.75-13.25 GHz and 10.7-11.7 GHz bands in this new competitive environment. 26/

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26/ In the Ka-band proceeding, GE Americom suggested that, in order to make room for FSS operations, CARS and other licensees operating in the 18.1-18.8 GHz band could be relocated to the 12.75-13.25 GHz band. *See In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite Service Use*, Docket No. 98-172, *et al.*, *Reply Comments of GE American Communications, Inc.* (filed Dec. 21, 1998) at 10. The Commission should ensure that any allocation of the 12.75-13.25 GHz band to NGSO FSS providers does not conflict with potential CARS operations in this band.

**G. Applying eirp, Antenna Diameter Limits, and Coordination Requirements to NGSOs in the 13.8-14.0 GHz Band.**

[Responsive to ¶¶ 42-43]

To facilitate sharing with incumbent Government operations, the *NPRM* proposes to subject NGSO FSS providers to the same eirp, minimum antenna limits, and coordination requirements that apply to GSO FSS providers. *Id.* at ¶ 42. GE Americom strongly agrees that NGSO FSS operators should be subject to the same antenna standards in these areas as GSO FSS licensees. Regulatory parity is important because GSO and NGSO FSS providers will be competing for the same customers in the U.S. market. Excluding new entrants from any of the requirements that apply to GSO FSS providers will place GSO operators at a distinct and significant disadvantage in the marketplace and cannot be tolerated.

**H. Arc Avoidance.**

[Responsive to ¶ 75]

The *NPRM*'s suggestion not to require NGSO FSS providers to implement arc avoidance measures does not sufficiently protect GSO FSS operators in the Ku-band and should be reconsidered. *Id.* at ¶ 75. While it is true that pfd limits alone can help shield GSO Ku-band licensees from NGSO FSS operations, simply ascribing pfd limits to various space and earth stations may not be enough. Arc avoidance is a useful tool in minimizing interference dangers, especially NGSO FSS main beam to GSO FSS main beam interference. NGSO FSS applicants have



realized the utility of arc avoidance and have made it the cornerstone of their sharing proposals.

As the *NPRM* states, arc avoidance requirements are easy to administer, and can be made a condition of receiving a Ku-band license. *Id.* Arc avoidance can also protect NGSOs from GSO satellites and earth stations, and would be beneficial in the protection of GSO satellites in slightly inclined orbits. *Id.* For these reasons, the Commission should reconsider its proposal and require NGSOs to implement arc avoidance measures.

**I. Off-axis eirp Density Limits.**

[Responsive to ¶ 77]

Consistent with the current ITU recommendation, as modified at the Working Party 4A meeting in October of 1998, the *NPRM* seeks to apply the off-axis eirp density levels to GSO FSS earth stations in the 12.75-13.25 GHz, 13.8-14.0 GHz, and 14.0-14.5 GHz bands. *Id.* at ¶ 77. These limits would apply in any direction within three degrees of the GSO arc. *Id.* GE Americom supports this proposal, and believes that any system currently registered with the ITU should be grandfathered under this standard if the off-axis eirp density levels become more stringent at the ITU.

**J. Antenna Performance Requirements for NGSOs.**

[Responsive to ¶¶ 38, 78]

The *NPRM* proposes to require NGSO FSS user terminal antennas to meet the antenna performance requirements of Section 25.209 of the Commission's rules. *Id.* at ¶¶ 77-78 GE Americom supports the *NPRM*'s proposal and, in addition, suggests that NGSO FSS providers be subject to all other Part 25 requirements as well. NGSO FSS providers should further be subject to any antenna limitations that apply to GSO FSS operators in particular frequencies. 27/

As described above, regulatory parity between GSO and NGSO systems is essential to achieving a competitive playing field for satellite service providers. NGSO compliance with Part 25 will also help minimize interference with GSO FSS providers, allow for enhanced sharing among NGSO systems, and lead to the creation of off-axis eirp density limits for NGSO FSS providers (as they will have to adhere to all of the Commission's antenna rules).

**K. Software Tools.**

[Responsive to ¶ 80]

Internationally, JTG 4-9-11 is developing software specifications for use by the ITU in determining whether a NGSO FSS system meets the requisite pfd limits. *Id.* at ¶ 80. The *NPRM* notes that the Commission has similar needs and

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27/ See, e.g., *NPRM* at ¶ 38 (discussing technical constraints on FSS in the 13.75-14.0 GHz band).

seeks comment on whether the U.S. should use a commonly accepted software tool, such as the one being developed by JTG 4-9-11, to perform these analyses. *Id.*

GE Americom strongly supports the use of a standard software tool to assist the Commission in verifying that a proposed NGSO FSS system meets the appropriate pfd limits. A common methodology for interference measurement is crucial to enforcement of the aggregate and single entry limits necessary to accommodate NGSO systems in the Ku-band.

A number of satellite service providers already use standard software tools to assist them in the planning and deployment of space and earth stations. For example, GSO FSS providers use the ASIA program written by the Commission to determine whether a proposed system will cause interference; BSS providers use the M Space program provided by the ITU for similar purposes. NGSO FSS providers should be required to do the same.

As described in the *NPRM*, it is likely that the ITU will develop a software tool applicable to GSO/NGSO sharing. If this happens, the Commission should adopt it for domestic use so long as it meets the requisite criteria. When the Commission adopts this tool, it should also require its use by all NGSO FSS providers. This will ensure that all carriers are working from the same assumptions, as well as inject administrative efficiency into the sharing process.

In order for the software tool to be useful, the Commission should require NGSO FSS providers to submit their data on a timely basis so that it is

readily available to carriers. The Commission should also ensure that each NGSO applicant provide its system characteristics in a transparent manner so that beam switching algorithms and other system operations criteria are understood by all interested parties. If an NGSO believes certain information to be proprietary, then it should be required to isolate the information that needs to be verified internationally and domestically, and provide that information.

Finally, an effort is currently underway to insure that the provisions of ITU-R Resolutions 130, 131 and 538 are codified by the ITU once pfd limits are finalized at WRC-2000. Many of these provisions include service rules that the Commission should consider incorporating for sharing purposes here.

**L. NGSO RF Safety Guideline Compliance.**

[Responsive to ¶ 83]

Section 1.1307(b) of the Commission's rules requires that all systems authorized under Part 25 comply with the Commission's environmental evaluation requirements. *See* 47 C.F.R. § 1.1307(b). The *NPRM* expresses concern that the ubiquitous manner in which customers may install NGSO FSS subscriber terminals could cause NGSO systems to run afoul of these requirements. *NPRM* at ¶ 83. The *NPRM* therefore seeks comment on ways to ensure that NGSO FSS systems comply with the Commission's environmental RF safety guidelines. *Id.*

Generally, NGSO FSS operators should be subject to the same environmental, antenna siting and RF safety guidelines as all other Commission

licensees. This regulatory uniformity is critical to maintaining a level playing field for all satellite service providers.

The unique characteristics of NGSO FSS earth stations, however, may require additional precautions to be taken. Specifically, because NGSO FSS antennas are movable, they should be surrounded by larger safe zones to take into account their multi-directional capabilities. These larger safe zones are necessary to ensure that people are not subject to excessive RF radiation.

In response to the *NPRM*'s inquiry as to who should be responsible for ensuring that the Commission's radiohazard provisions are followed for NGSO FSS antennas, GE Americom asserts that the licensees of NGSO earth stations should have this responsibility. In the GSO environment, earth station licensees have the responsibility of ensuring radiohazard compliance. There is no reason to treat NGSO earth station licensees any differently.

**M. Licensing and Service Rules.**

[Responsive to ¶¶ 84-90]

The *NPRM* seeks comment on which licensing and service rules -- including, among others, coverage requirements, financial qualification requirements, implementation milestones, and reporting requirements -- should apply to NGSO FSS operations. *Id.* at ¶¶ 84-90. Again, it is vital that NGSO FSS providers be subject to the same regulatory framework as GSO FSS providers. Only in this manner will a competitive market for satellite services be achieved.

Exempting NGSO FSS providers from rules applicable to GSO FSS operators will provide new entrants with an unfair advantage vis-à-vis their competitors. NGSO FSS systems should therefore be subject to the same (or equivalent) rules as GSO FSS providers.

## CONCLUSION

For the reasons stated above, the Commission should condition NGSO FSS operations in the Ku-band on aggregate pfd limits for NGSO FSS providers as a group, including rigid single entry pfd limits designed to enforce that cap. Furthermore, based on the available technical analysis to date, pfd limits for NGSO FSS spacecraft, earth stations and antennas should reflect the ones proposed by the United States in the JTG 4-9-11 process. The Commission should also condition NGSO FSS entry on the other technical and mechanical considerations discussed above. Only by adhering to these principles will the Commission successfully introduce and be able to maintain effective NGSO and GSO FSS sharing in the Ku-band.

Respectfully submitted,

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## CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Comments of GE American Communications, Inc. in ET Docket No. 98-206 was served by hand delivery (indicated by “\*”) or U.S. First Class mail, this 2nd day of March, 1999 to:

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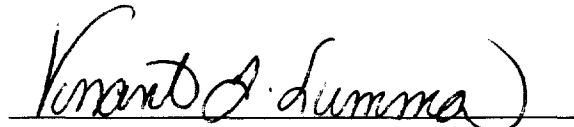
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